FYI
VYOAS

12-235

SOIL AND MATERIAL CONSULTANTS, INC.

office: 1-847-870-0544
fax: 1-847-870-0661
www.soilandmaterialconsultants.com
us@soilandmaterialconsultants.com

October 23, 2012
File No. 20779

Mr. Richard Salerno
Village of Villa Park
20 S. Ardmore Avenue
Villa Park, IL 60181

Re: Geotechnical Investigation
Lufkin Park
1000 S. Ardmore Ave.
Villa Park, Illinois

Dear Mr. Salerno:

The following is our report of findings for the geotechnical investigation completed at Lufkin Park located at 1000 S. Ardmore Ave. in the Village Villa Park, Illinois.

The investigation was requested to determine current subsurface soil and water conditions at select boring locations. The findings of the field investigation and the results of laboratory testing are intended to assist in the planning, design and construction of proposed site improvements. We understand the pool is proposed to be removed and reconstructed. There is currently no specific site plan for the reconstruction.

SCOPE OF THE INVESTIGATION

The field investigation included obtaining 3 borings at the locations requested and as indicated on the enclosed location sketch. The boring locations were established in the field by the client. Surface elevations were determined using the temporary benchmark indicated on the location sketch.

We auger drilled the borings to the scheduled depths of 20.0 feet below existing surface elevations. Boring 1 was extended to 30.0 feet and boring 2 was extended to 25.0 feet due to the presence of low strength soils. Soil samples were obtained using a split barrel sampler advanced utilizing an automatic SPT hammer. Soil profiles were determined in the field and soil samples returned to our laboratory for additional testing including determination of moisture content. Cohesive soils obtained by split barrel sampling were tested further to determine dry unit weight and unconfined compressive strength. The results of all field determinations and laboratory testing are included in summary with this report.

RESULTS OF THE INVESTIGATION

Enclosed are boring logs indicating the soil conditions encountered at each location. Site surface conditions include the existing structure, bituminous pavement, vegetation, topsoil and fill soil conditions.

Fill soil conditions were encountered at each of the boring locations. Composition of the fill includes the presence of topsoil, clay/silt and silt/clay mixtures extending to depths of 1.5 feet to 6.0 feet at these boring locations. The limits of fill placement were not determined within the scope of this investigation. The fill soil conditions are found to overlie the apparent natural topsoil at borings 1 and 2. The topsoil is classified as black silt/clay mixtures with traces of roots sometimes present.

Underlying natural soil conditions include the presence of cohesive soils. These are classified as very soft to hard clay/silt mixtures with lesser portions of sand and gravel. These soils are sometimes high in moisture content with values in excess of 30.0% determined.

Non-cohesive soils were also encountered. These include very loose to loose organic silt, silt/clay, silt/sand and sand/gravel mixtures. The non-cohesive soils are often in a very damp to saturated condition. Cobbles and boulders may be present within the site soils at any elevation, although none were encountered while drilling.

Significant deposits of organic matter and organic silt were encountered at borings 1 and 2. These soils have high moisture contents and very low-strength. These conditions are likely present in other areas of the site but were not discovered within the scope of this investigation.

The following table summarizes depth ranges below existing grade, the magnitude of soil strength within these ranges and other information:

Boring	Surface Elevation (feet)	Depth Range Below Existing Surface (feet)	Soil Strength (lbs./sq.ft.)	Recorded Water Levels, W.D./A.D. (feet)
1	97.9	0.5 to 3.5	*None	13.0/23.0
		3.5 to 4.5	*500	
		4.5 to 13.5	*None	
		13.5 to 15.5	1,500	
		15.5 to 21.0	*1,000	
		21.0 to 26.0	2,000	
		26.0 to 27.0	3,000	
2	98.2	1.5 to 5.5	*None	10.5/23.0
		5.5 to 6.0	*500	
		6.0 to 13.5	*None	
		13.5 to 22.0	3,000	
3	99.0	0.5 to 6.5	*2,000	6.0/12.0
		6.5 to 8.5	3,000	
		8.5 to 11.0	4,000	
		11.0 to 17.0	3,000	

* Not recommended for support of foundations. Deeper foundation depths or foundations supported on coarse crushed stone fill may be needed to reduce the magnitude of long-term total and differential settlement.

It is expected that foundations can be supported on undisturbed natural soils located at any elevation within the depth ranges indicated in the above table, except as noted. Within the noted depth ranges the soils are not considered able to support foundations, even at reduced design bearing values, due to long-term settlement considerations.

SUBSURFACE WATER

The boring logs and the above table indicate the depth at which subsurface water was encountered in the bore holes at the time of the drilling operations and during the period of these readings. It is expected that fluctuations from the water levels recorded will occur over a period of time due to variations in rainfall, temperature, subsurface soil conditions, soil permeability and other factors not evident at the time of the water level measurements.

FOUNDATIONS

There is currently no site or foundation plan available at this time to provide specific foundation recommendations. Generally, it should be noted that the presence of deep unsuitable soil conditions indicated at borings 1 and 2 would most likely require a deep foundation system. A caisson foundation system, designed by a licensed structural engineer, can be utilized to transmit loads through the unsuitable soil conditions and into the suitable soil conditions present at the deeper elevations. Caissons designed for end bearing should extend about 3.0 feet or

deeper into cohesive soils and should bottom in soils possessing the design bearing strength. The bottom of the shafts can be belled to increase the load carrying capacity of each caisson. This will require extending the drilled shaft further into the cohesive soils as needed to assure non-caving soil conditions in the sidewall of the bell. Temporary or permanent casing extending above the ground surface is needed to prevent caving of the soil around the top of the drilled shaft. Further, temporary or permanent casing will be needed when drilling through caving soils or through soft soils which squeeze thus narrowing the diameter of the drilled shaft. The casing will also reduce the volume of water seeping into the drilled shaft.

Continuous and isolated footing foundations may be considered for support of the building loads in the area of boring 3. These foundations can be supported on undisturbed natural soils located below all topsoil, organic silt, unsuitable fill soils, low strength soils and other unsuitable conditions which may be encountered.

All exterior building foundations should extend at least 42.0 inches below exposed surface elevations to provide adequate protection against uplift due to freezing of the supporting soils. Foundations for unprotected improvements should extend at least 48.0 inches below exposed surface elevations. We recommend providing adequate reinforcing steel in foundation walls and piers to minimize the effects of long-term differential settlement. Soil strength values and the depths at which they are expected to be encountered at these boring locations are indicated in the above table.

Foundations can be constructed at shallower depths than those indicated in the above table by preparation of the building pad in advance of foundation excavation. This can be accomplished during site grading by the full-depth removal of unsuitable and low strength soils followed by replacement with properly compacted structural fill. Removal should be accomplished over the entire building pad as needed to provide the supplemental benefit of adequate support of interior slabs. Variations in the depth of removal can be anticipated due to naturally changing soil conditions. The removal should extend beyond the face of perimeter footings to a distance at least equal to the depth of fill that will be present beneath the perimeter footings. Preparation of supporting soils should be in accordance with our recommendations for Subgrade Soil Preparation.

FLOOR SLABS

Floor slabs planned for support on the existing soil conditions are expected to undergo some degree of long-term settlement as the soils consolidate under loading and as they shrink due to desiccation. Slabs may be considered for support on suitable natural soils or on properly placed and compacted fill soils. This is feasible when the soils supporting the slabs are prepared in accordance with the recommendations for Subgrade Soil Preparation. These include the removal of topsoil as well as removal or aeration of underlying high moisture content soils.

When the building is supported on a deep foundation system, the differential movements of slabs relative to foundations can result in the need to raise or repair the slabs at a future date. We recommend that reinforced cast in place slabs, precast slabs or alternate systems be

supported on the deep foundations. The slabs can also be supported on grade beams constructed between these foundations. Underground utilities determined susceptible to excessive settlement may also require support on deep foundations.

DEWATERING

Excavations may require dewatering due to subsurface water seepage and/or surface precipitation. This water can likely be removed by standard sump and pump operations. Soils exposed at foundation, slab or undercut elevations should not be permitted to become saturated. Loss of bearing strength and stability may occur, requiring additional soil excavation.

Fill soils, organic soils, non-cohesive soils and others can be unstable when saturated. These soils tend to cave or run when submerged or disturbed. The stability of exposed embankments is minimal to non-existent as confining soil pressures are removed. Proper drainage within excavations is necessary at all times, particularly when excavations extend below anticipated water levels and below saturated soils.

The contractor should be made responsible for designing and constructing stable temporary excavations. Also, the contractor should shore, slope, bench or restrain the sides of the excavations as required to maintain stability of both the excavation sides and bottom. In no case, should the slope, slope heights, or excavation depth exceed those in the local, state, and federal safety regulations.

Permanent dewatering of basement, crawl space and other below grade areas is necessary. The dewatering system should include the provision for peripheral drain tile adjacent to the footings of foundation walls exposed to the interior of the building. Drain tile runs should also be provided below basement floor slabs. We recommend damp-proofing or possibly water-proofing exterior foundation walls exposed to the interior of the building. Water stop may be necessary in concrete cold joints such as the footing/wall interface.

SUBGRADE SOIL PREPARATION

Subgrade soil preparation should be accomplished where needed within the building area prior to excavation for foundations. The procedure in all areas of subgrade supported improvements should include the removal of unsuitable surface conditions including vegetation, topsoil, unsuitable fill soils, weak or unstable soils, and other deleterious conditions which may be encountered. Above grade areas should be cut to design subgrade elevations. Exposed subgrade soils should be leveled, compacted and proof-rolled in the presence of the Soil Engineer.

Proof-rolling may reveal areas of unstable soil conditions. Discing and aeration of high moisture content soils can be effective to depths of up to 1.0 foot, depending upon the equipment utilized. Removal of unstable soils may be necessary if high moisture content conditions extend to depths greater than the effective depth of discing. If the depth of undercut appears to be significant, it may be economical to limit the depth of undercut to that needed to

establish adequate support of slabs and remediate weak soil conditions at foundation elevations at the time of foundation construction.

Soft or unstable soil conditions in pavement areas can often be bridged by use of an effective depth of crushed granular material. The placement of the crushed granular bridging material, possibly in conjunction with the use of an appropriate geotextile fabric, should only proceed after review of the proof-roll conditions by the Soil Engineer. Long-term settlement of pavement surfaces may occur locally as the bridged soils desiccate.

Structural fill can be placed on soils prepared to the satisfaction of the Soil Engineer. The fill should be placed in lifts not to exceed 8.0 inches when uncompacted. Each lift should exceed minimum compaction requirements prior to placement of the next lift. We recommend a minimum of 95% compaction based on the modified Proctor test, ASTM D-1557, be achieved within building areas. A minimum of 90% compaction should be achieved beneath exterior improvements such as pavements and sidewalks. Compaction requirements also apply to backfill placement around foundations and within trench excavations located below subgrade supported improvements.

FILL SOURCES

The onsite non-organic soils are generally suitable for reuse as fill. Offsite sources may also be used provided they are approved in advance by the Soil Engineer. Aeration may be necessary to reduce soil moisture content prior to compaction. Soil borrowed from near the surface where seasonal fluctuations in soil moisture content occur may require particular attention. The moisture content of fill soils should be within approximately 3.0% of optimum moisture content as determined by the modified Proctor test for the soils to meet or exceed minimum compaction requirements.

CONCLUSION

The information within this report is intended to provide initial information concerning subsurface soil and water conditions on the site. Variations in subsurface conditions are expected to be present between boring locations due to naturally changing and filled soil conditions.

Our understanding of the proposed improvements is based on limited information available to us at the writing of this report. The findings of the investigation and the recommendations presented are not considered applicable to significant changes in the scope of the improvements or applicable to alternate site uses. We recommend that proposed foundation, pavement and grading plans be reviewed by our office to determine if additional considerations are necessary to address anticipated subsurface conditions. Obtaining additional soil borings will be warranted to further define the depth and limits of restrictive subsurface conditions.

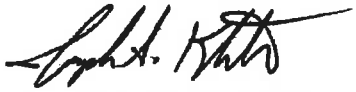
The soils exposed in soil undercut areas should be evaluated for suitability prior to placement of structural fill, as previously indicated in this report. Soils and aggregates placed as structural fill should be tested as the work progresses to verify that minimum compaction requirements have

been met. We recommend that soil conditions encountered at foundation elevations be tested to verify the presence of design soil strength prior to concrete placement.

If you have any questions concerning the findings or recommendations presented in this report, please let me know.

Very truly yours,

SOIL AND MATERIAL CONSULTANTS, INC.



Joseph A. Klawitter, P.E.
Project Engineer

JAK:ek
Enc.

N

SMC	SOIL AND MATERIAL CONSULTANTS, INC.	LOCATION SKETCH
Client:	VILLAGE OF VILLA PARK	
Project:	1000 S. ARDMORE AVENUE	
Location:	VILLA PARK, ILLINOIS	
File No. 20779	Date: 10-05-12	Scale: NONE

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 1

Logged By: DA **Page:** 1 of 1

Client: Village of Villa Park

File No. 20779 **Date Drilled:** 10/5/12

Reference: Lufkin Park
Villa Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft	CLASSIFICATION Elevation 97.9' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	(a) see below		27.8		
	(b) see below		22.6		
	Black silt,some clay,trace sand & roots, damp,loose(topsoil)	6	23.6		
5	Brown-gray clay,some silt,trace organic matter,damp-very damp,very tough to stiff	4	24.0	99.9	2.0
		3	33.4	88.6	0.8
10	Gray organic silt,very damp,very loose	2	79.4		
	Gray silt,some clay,trace organic matter, very loose ▽	1	41.2		
15	Gray silt,some fine sand,trace clay,very damp,loose	6	18.3		
20	Gray clay,some silt,trace sand & gravel, very damp,soft	4	21.6	110.1	0.3
	Gray clay,some silt,trace sand & gravel, very damp-damp,stiff to very tough				
25		7	17.7	122.0	0.7
30	End of Boring	11	17.2	120.7	2.1
	(a) Black silt,some clay,trace sand & roots,damp (topsoil) - Fill				
35	(b) Brown-dark brown-black clay & silt, trace sand,damp,very tough - Fill				
40					

○ unconfined compressive strength, tons/sq.ft.
● penetrometer reading, tons/sq.ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40

Water encountered at 13.0 feet during drilling operations (W.D.).
Water recorded at 23.0 feet on completion of drilling operations (A.D.).
Water recorded at feet hours after completion of drilling operations (A.D.).

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 2

Logged By: DA Page: 1 of 1

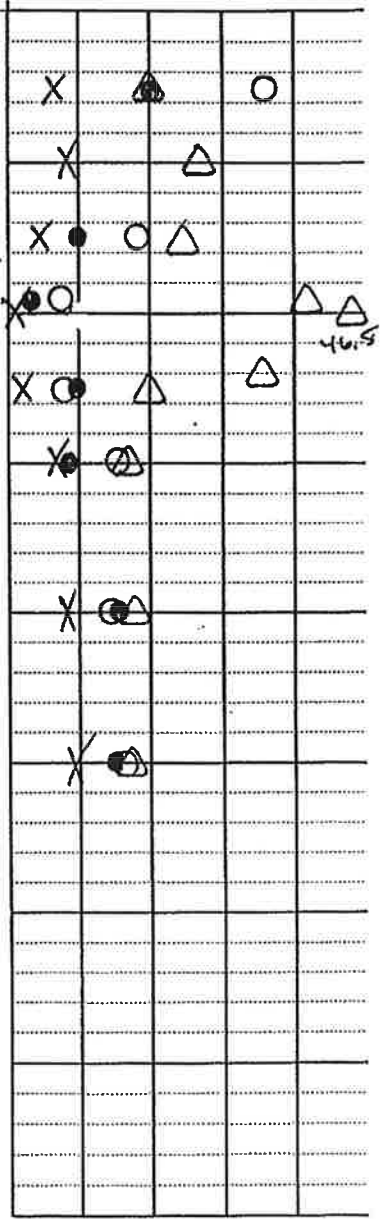
Client: Village of Villa Park File No. 20779 Date Drilled: 10/5/12

Reference: Lufkin Park
Villa Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 98.2' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	(a & b) see below				
	Black-brown-gray clay,some silt,trace sand,damp,very tough - Fill	6	20.1	104.9	3.5
5	Black silt,some clay,trace sand,damp, loose (topsoil)	8	26.6		
	Brown-gray clay,some silt,trace organic matter,very damp,tough to stiff	4	23.5	100.7	1.9
10	(c) see below ▽ 9.8'	1	41.1 46.5	79.2	0.7
	Gray clay & silt,trace sand,very damp, very soft				
	(d) see below	2	35.5 19.9	113.0	0.8
15	Brown-gray clay & silt,trace sand & gravel,very damp,tough	6	17.1	113.7	1.5
20	Gray clay,some silt,trace sand & gravel, damp,tough	8	19.2	116.2	1.4
25	End of Boring	9	18.2	115.3	1.6
	(a) Bituminous concrete - 4.5"				
	(b) Limestone,damp - 7.5"				
30	(c) Gray organic silt,some clay,very damp,very loose				
	(d) Gray clay,some silt,trace sand & gravel,very damp,stiff				
35					
40					



Water encountered at 10.5 feet during drilling operations (W.D.).
Water recorded at 23.0 feet on completion of drilling operations (A.D.).
Water recorded at feet hours after completion of drilling operations (A.D.).

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 3

Logged By: DA Page: 1 of 1

Client: Village of Villa Park

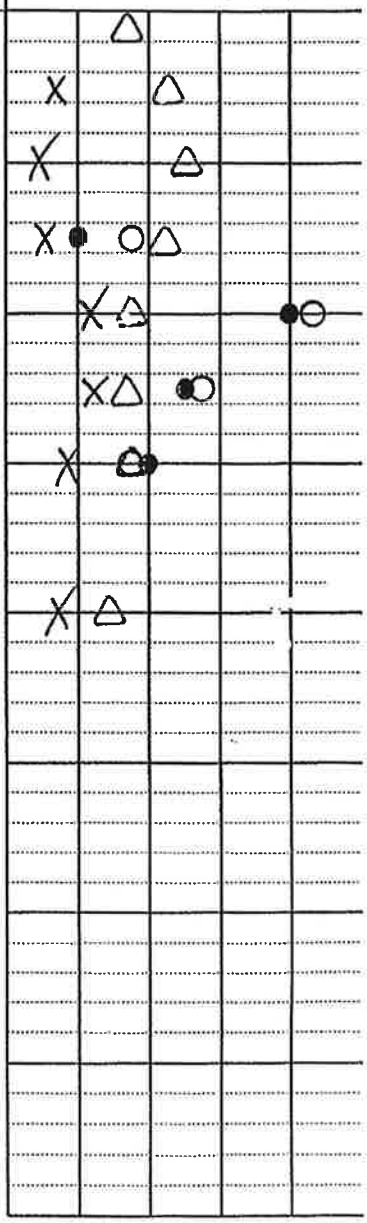
File No. 20779 Date Drilled: 10/5/12

Reference: Lufkin Park
Villa Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 99.0' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	Brown-dark brown-brown silt,some clay, trace sand & roots,damp,loose - Fill		18.3		
		7	20.8		
5		5	24.5		
	Brown-gray clay,some silt,trace sand, very damp,tough	5	21.0	105.6	1.8
10	Brown clay,some silt,trace sand & gravel, damp,hard	12	18.6	117.2	4.3
	Gray clay,some silt,trace sand & gravel, damp,very tough to tough	12	16.1	122.2	2.6
15		8	18.0	111.5	1.8
20	Gray fine sand,trace medium-coarse sand, gravel & silt,very damp,loose	7	14.4		
	End of Boring				
25					
30					
35					
40					



Water encountered at 6.0 feet during drilling operations (W.D.).
Water recorded at 12.0 feet on completion of drilling operations (A.D.).
Water recorded at feet hours after completion of drilling operations (A.D.).

G-303

SOIL AND MATERIAL CONSULTANTS, INC.

General Notes

SAMPLE CLASSIFICATION

Soil sample classification is based on the Unified Soil Classification System, the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM D-2488, the Standard Test Method for Classification of Soils for Engineering Purposes, ASTM D-2487(when applicable), and the modifiers noted below.

CONSISTENCY OF COHESIVE SOILS

Term	Qu -tons/sq. ft.	N (unreliable)
Very Soft	0.00 - 0.25	0 - 2
Soft	0.26 - 0.49	3 - 4
Stiff	0.50 - 0.99	5 - 8
Tough	1.00 - 1.99	9 - 15
Very Tough	2.00 - 3.99	16 - 30
Hard	4.00 - 7.99	30 +
Very Hard	8.00 +	

RELATIVE DENSITY OF GRANULAR SOILS

Term	N - blows/foot
Very Loose	0 - 4
Loose	5 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	50 +

IDENTIFICATION AND TERMINOLOGY

Term		Size Range
Boulder		over 8 in.
Cobble		3 in. to 8 in.
Gravel	-coarse	1 in. to 3 in.
	-medium	3/8 in. to 1 in.
	-fine	#4 sieve to 3/8 in.
Sand	-coarse	#10 sieve to #4 sieve
	-medium	#40 sieve to #10 sieve
	-fine	#200 sieve to #40 sieve
Silt		0.002 mm to #200 sieve
Clay		smaller than 0.002 mm

Modifying Term	Percent by Weight
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

Moisture Condition

Dry
Damp
Very Damp
Saturated

DRILLING, SAMPLING & SOIL PROPERTY SYMBOLS

CF - Continuous Flight Auger
HS - Hollow Stem Auger
HA - Hand Auger
RD - Rotary Drilling
AX - Rock Core, 1-3/16 in. diameter
BX - Rock Core, 1-5/8 in. diameter
NX - Rock Core, 2-1/8 in. diameter
S - Sample Number
T - Type of Sample
J - Jar
AS - Auger Sample
SS - Split-spoon (2 in. O.D. with 1-3/8 in. I.D.)
ST - Shelby Tube (2 in. O.D. with 1-7/8 in. I.D.)
R - Recovery Length, in.
B - Blows/ 6 in. interval, Standard Penetration Test (SPT)
N - Blows/ foot to drive 2 in. O.D. split-spoon sampler with 140 lb. hammer falling 30 in., (STP)
Pen. - Pocket Penetrometer reading, tons/ sq. ft.
W - Water Content, % of dry weight
Uw - Dry Unit Weight of soil, lbs./ cu. ft.
Qu - Unconfined Compressive Strength, tons/ sq. ft.
Str - % Strain at Qu.
WL - Water Level
WD - While Drilling
AD - After Drilling
DCI - Dry Cave-in
WCI - Wet Cave-in
LL - Liquid Limit, %
PL - Plastic limit, %
PI - Plasticity Index (LL-PL)
LI - Liquidity Index [(W-PL)/PI]